Spring 2021

ENE 262-002: Introduction to Environmental Engineering

Wen Zhang

ENE 262 – INTRODUCTION TO ENVIRONMENTAL ENGINEERING

Spring 2021

Instructor: Wen Zhang, Ph.D., P.E., BCEE
Office Hours: Every Tuesday and Thursday from 10:00 am to 11:00 am or by appointment
Room 211 Colton Hall
Phone: (973) 596-5520
Email: wen.zhang@njit.edu
Lecture location/time: 11:30 am – 1:30 pm (Tuesday and Thursday) Synchronous online and WebEx address (permanent): https://njit.webex.com/join/wzhang81; Date: January 19, 2021-May 6, 2021

ENE Lab TAs: "Parameswarappa Jayalakshmamma, Meghana" mp848@njit.edu
Office: Room 421 Colton Hall.

Description:
To introduce students to the interdisciplinary science, engineering, design and management concepts of engineered environmental systems. The course will cover environmental parameters, mass balance and natural systems, water quality management, water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management. Background material and laboratories in the environmental sciences and management areas will be covered. Group term papers and presentations will be required.

Prerequisites: Chem 125, Math 112, and Phys. 121

Course Objectives:
1. Provide students with the scientific background needed to assess environmental quality in terms, of the physical, chemical and biological aspects.
2. Provide students with the tools necessary to understand mass balance in environmental systems.
3. Provide students with the basic scientific and engineering principles and technologies in water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management.
4. Introduce students to technical writing, literature search and digestion and case studies.

Suggested Textbook(s)/Materials:
Davis, M.L. and Cornwell, D.A., Introduction to Environmental Engineering, 5th Edition, McGraw Hill Companies, New York, NY, 2013, ISBN 978-0-07-340114-0
Note: Handouts/slides are the main materials that we use for homework and exams.

Grading:

Midterm exam	20%
Final Exam	20%
Three lab sessions and reports	15%
Homework assignments	45%

No late homework is accepted (no exceptions). Students need to make proper arrangement to meet homework or project deadlines. However, additional assignment may be available for grade makeup. Bonus points are given for active participation, timely homework submissions and other positive involvement.

Final grade is calculated with the above breakdown that is assessed usually on a 100 point basis. Your grade will be=if(>90,"A",IF(>85,"B+",IF(>70,"B",IF(>65,"C+",IF(>55,"C",IF(>50,"D"))))))

Tentative course schedule or guideline (Subject to changes with advance notices)

Week	Class date	Topic
1	01/19 01/21	Introduction to the roles of environmental engineering; microbiological challenges; mitigation measures; research opportunities; indoor air pollution; Disinfection against microbial pathogens
2	01/26 01/28	Air pollutant removal processes
3	02/02 02/04	Water chemistry fundamentals
4	02/9 02/11	Water Chemistry (alkalinity, hardness, dissolution, etc.)
5	02/16 02/18	Water Treatment and Water Pollution
6	02/23 02/25	Wastewater Treatment Technologies
7	03/02 03/04	Water Reuse First lab in Colton 414: alkalinity/hardness
8	03/09 03/11	Second Lab in Colton 414: Multi-media filtration
9	03/16 03/18	Spring break
10	03/23 03/25	**Midterm exam** Membrane filtration
11	03/30 04/01	
12	04/06 04/08	Third Lab in Colton 414: jar tests or adsorption test
13	04/13 04/15	Electrochemistry and microbial fuel cell
14	04/20 04/22	Air flotation
15	04/27 04/29	Noise Pollution & Control Last class
16	05/04 05/06	Friday Classes Meet (No class) Reading day
17		**Final Exam date/location TBD**

Program Educational Objectives Addressed: 1, 2

Course Objectives Matrix – ENE 262 Introduction to Environmental Engineering

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Describe and discuss relevant environmental regulations ethics and standards; the driving forces behind environmental science and engineering projects.			
Define environmental science and engineering	4, 7	1	Homework, class, discussions and examinations.
Explain and discuss current and proposed relevant regulations, standards and ethical rules.	4	1	Homework and examinations.
Student Learning Outcome 2: Assess environmental quality in terms of the physical, chemical and biological aspects.			
Provide an overview of environmental sciences and parameters.	1, 2	1, 2	Homework, class discussions, and examinations.
Conduct experiments in the environmental sciences.	6, 5	1, 2	Laboratory group discussions and laboratory reports.
Student Learning Outcome 3: Illustrate mass balance in environmental systems.			
Illustrate the mass balance approach.	1, 2	1, 2	Homework, class examples and examinations.
Student Learning Outcome 4: Recognize the basic scientific and engineering principles of water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management.			
Introduce the scientific and engineering principles of water treatment.	2	1, 2	Homework, class discussions and examinations.
Introduce the scientific and engineering principles of wastewater treatment.	2	1	Homework, class discussions, and examinations.
Introduce the scientific and engineering principles of air pollution and control	2	1	Homework, class discussions and examinations.
Introduce the scientific and engineering principles of noise pollution and control.	2	1	Class examples, and examinations.
Introduce the scientific and engineering principles of solid and hazardous waste management.	2	1	Homework, class discussions, and examinations.
Course Objective 5: Practice environmental report writing.			
Provide the mechanisms of environmental report writing.	3	1, 2	Class discussions and case study paper.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program educational objectives are reflected in the achievements of our recent alumni:

1 – Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18

Accessibility:
Any student who has a need for accommodation based on the impact of a disability should contact the Instructor privately to discuss the specific situation as soon as possible. Contact Disability Resources and Services to coordinate reasonable accommodations for students with documented disabilities. The NJIT web site below provides additional information: http://www.njit.edu/counseling/services/disabilities.php

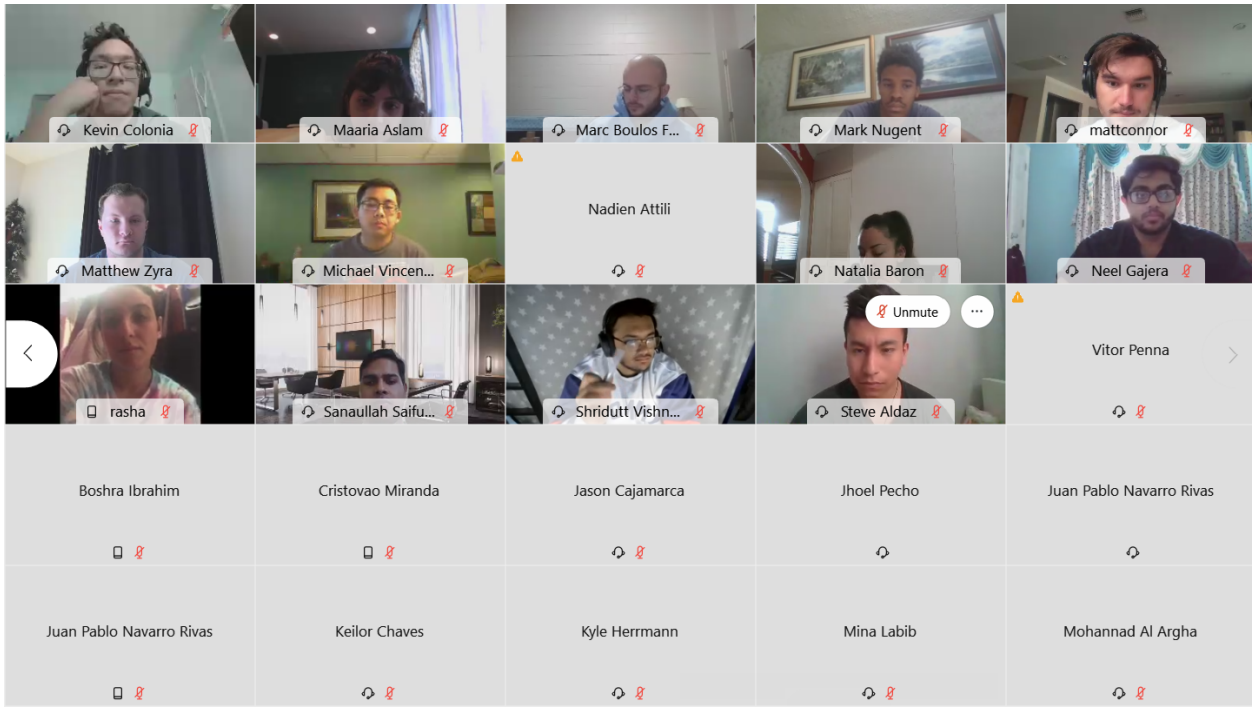
Participation:
Your participation in this class is important. Occasionally we will have in-class example problems and quizzes. Thus, you should always bring a calculator with you to class. In addition, students are expected to come to class to learn and no extra assistance on lecture content could be offered through e-mailing, text messaging, or phone calling. Cell phones should also be completely turned off or placed in vibrate mode.

Thinking critically and independently:
It is my sincere hope that as a graduate of Engineering, each student will be a thoughtful citizen as well as a fundamentally sound engineer. Your questions, thoughts, and comments are valuable and encouraged throughout this course.

Academic integrity:
Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:
http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"


Wen Z... (Host...)
Joseph Mcintyre
Andrew Jacobs...
Anthony Vallejo
Bruno Hinostr...
Brusca, Michae...
Bryan Rodriguez
Caitlyn Barbaro
Connor Maguire
David Cachro
David DaGraca
Derek Mejia
Diego Cabrera
Dylan Ramballi
J. Marie Swans...
James Lavender
Jarred Eccles
Jose Rodriguez
Juan Pablo Na...
Karen Guaman
Kenneth Andr...
Kevin Colonia
Maaria Aslam
Marc Boulos F...
Mark Nugent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Natalia Baron
Neel Gajera
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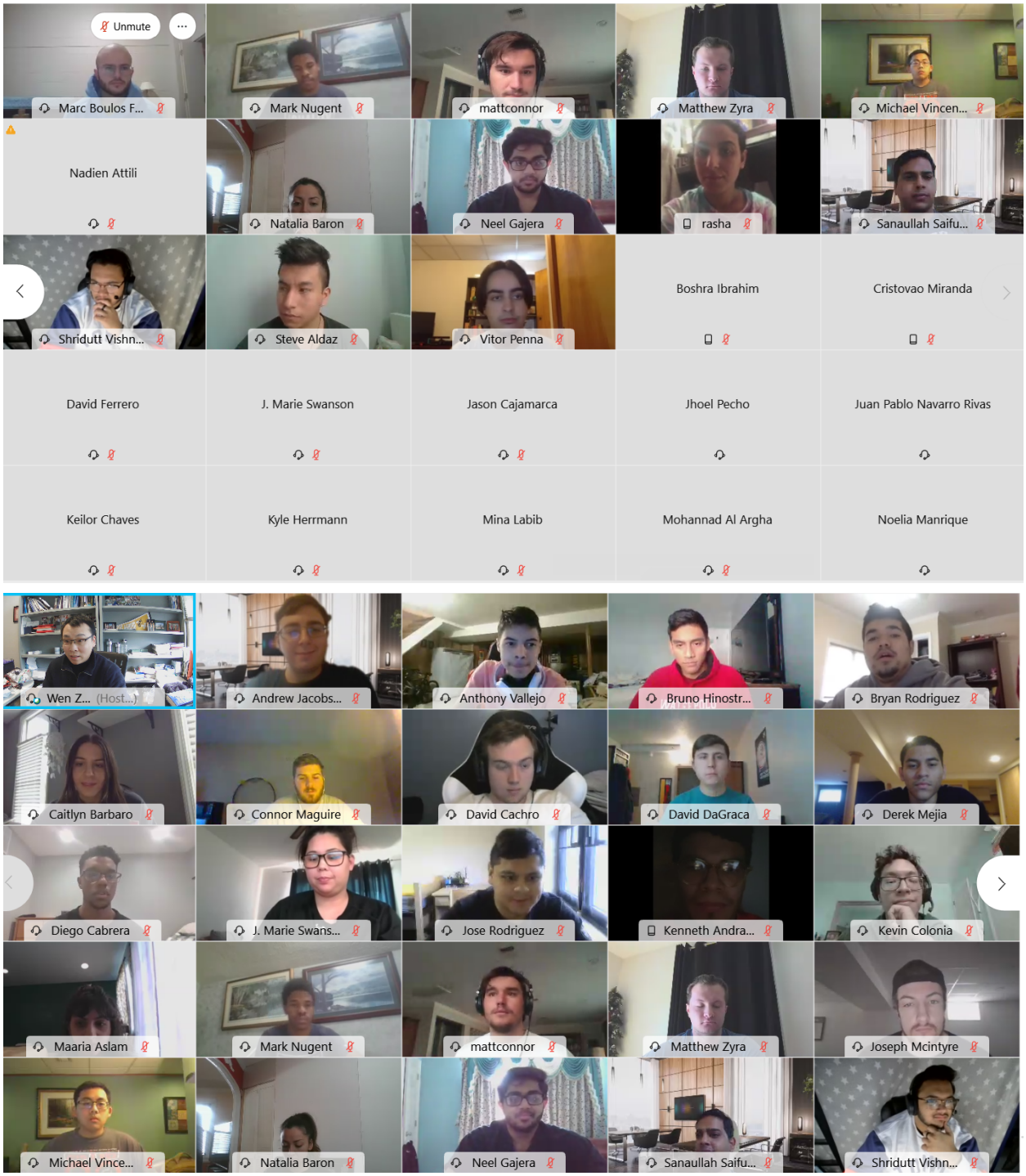
Sanaullah Saifu...
Shridutt Vishn...
Unmute
Steve Aldaz
Vitor Penna
Boshra Ibrahim
Cristovao Miranda
Jason Cajamarca
Jhoel Pecho
Juan Pablo Navarro Rivas
Juan Pablo Navarro Rivas
Keilor Chaves
Kyle Herrmann
Mina Labib
Mohannad Al Argha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Keilor Chaves
Kyle Herrmann
Mina Labib
Mohannad Al Argha
Noelia Manrique
Wen Z... (Host...)
Andrew Jacobs...
Anthony Vallejo
Bruno Hinostr...
Bryan Rodriguez
Caitlyn Barbaro
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David Cachro
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